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**PHILOSOPHICAL
TRANSACTIONS**

OF THE

ROYAL SOCIETY

OF

LONDON.

FOR THE YEAR MDCCCLII.

PART I.

LONDON:

PRINTED BY RICHARD TAYLOR AND WILLIAM FRANCIS, RED LION COURT, FLEET STREET.

MDCCCLII.

ADVERTISEMENT.

THE Committee appointed by the *Royal Society* to direct the publication of the *Philosophical Transactions*, take this opportunity to acquaint the Public, that it fully appears, as well from the Council-books and Journals of the Society, as from repeated declarations which have been made in several former *Transactions*, that the printing of them was always, from time to time, the single act of the respective Secretaries till the Forty-seventh Volume; the Society, as a Body, never interesting themselves any further in their publication, than by occasionally recommending the revival of them to some of their Secretaries, when, from the particular circumstances of their affairs, the *Transactions* had happened for any length of time to be intermitted. And this seems principally to have been done with a view to satisfy the Public, that their usual meetings were then continued, for the improvement of knowledge, and benefit of mankind, the great ends of their first institution by the Royal Charters, and which they have ever since steadily pursued.

But the Society being of late years greatly enlarged, and their communications more numerous, it was thought advisable that a Committee of their members should be appointed, to reconsider the papers read before them, and select out of them such as they should judge most proper for publication in the future *Transactions*; which was accordingly done upon the 26th of March 1752. And the grounds of their choice are, and will continue to be, the importance and singularity of the subjects, or the advantageous manner of treating them; without pretending to answer for the certainty of the facts, or propriety of the reasonings, contained in the several papers so published, which must still rest on the credit or judgement of their respective authors.

It is likewise necessary on this occasion to remark, that it is an established rule of the Society, to which they will always adhere, never to give their opinion, as a Body,

upon any subject, either of Nature or Art, that comes before them. And therefore the thanks, which are frequently proposed from the Chair, to be given to the authors of such papers as are read at their accustomed meetings, or to the persons through whose hands they received them, are to be considered in no other light than as a matter of civility, in return for the respect shown to the Society by those communications. The like also is to be said with regard to the several projects, inventions, and curiosities of various kinds, which are often exhibited to the Society ; the authors whereof, or those who exhibit them, frequently take the liberty to report and even to certify in the public newspapers, that they have met with the highest applause and approbation. And therefore it is hoped that no regard will hereafter be paid to such reports and public notices ; which in some instances have been too lightly credited, to the dishonour of the Society.

The Meteorological Journal hitherto kept by the Assistant Secretary at the Apartments of the Royal Society, by order of the President and Council, and published in the Philosophical Transactions, has been discontinued. The Government, on the recommendation of the President and Council, has established at the Royal Observatory at Greenwich, under the superintendence of the Astronomer Royal, a Magnetic and Meteorological Observatory, where observations are made on an extended scale, which are regularly published. These, which correspond with the grand scheme of observations now carrying out in different parts of the globe, supersede the necessity of a continuance of the observations made at the Apartments of the Royal Society, which could not be rendered so perfect as was desirable, on account of the imperfections of the locality and the multiplied duties of the observer.

A List of Public Institutions and Individuals, entitled to receive a copy of the Philosophical Transactions of each year, on making application for the same directly or through their respective agents, within five years of the date of publication.

Observatories.

Armagh.
Cape of Good Hope.
Dublin.
Edinburgh.
Greenwich.
Madras.

Institutions.

Barbadoes Library and Museum.
Calcutta Asiatic Society.
Cambridge Philosophical Society.
Dublin Royal Dublin Society.
..... Royal Irish Academy.
Edinburgh Royal Society.
London Admiralty Library.
..... Chemical Society.
..... Entomological Society.
..... Geological Society.
..... Geological Survey of Great Britain.
..... Horticultural Society.
..... Institute of British Architects.
..... Institution of Civil Engineers.
..... Linnean Society.
..... London Institution.
..... Medical and Chirurgical Society.
..... Queen's Library.
..... Royal Asiatic Society.
..... Royal Astronomical Society.
..... Royal College of Physicians.
..... Royal Geographical Society.
..... Royal Institution of Great Britain.
..... Royal Society of Literature.
..... Society of Antiquaries.
..... Society for the Encouragement of Arts.
..... The Treasury.
..... United Service Museum.
..... Zoological Society.
Malta Public Library.
Manchester Literary and Philosophical Society.
Oxford Ashmolean Society.
..... Radcliffe Library.
Swansea Royal Institution.
Woolwich Royal Artillery Library.

Belgium.

Brussels Royal Academy of Sciences.

Denmark.

Altona Royal Observatory.
Copenhagen Royal Society of Sciences.

France.

Paris Academy of Sciences.
..... Dépôt de la Marine.
..... École des Mines.

Paris Entomological Society.
..... Geographical Society.
..... Geological Society.
..... Jardin des Plantes.
Toulouse Academy of Sciences.

Germany.

Bonn Cæsarean Acad. of Naturalists.
Göttingen University.
Mannheim Observatory.
Munich Royal Academy of Sciences.

Italy.

Naples Institute of Sciences.
Milan Institute of Sciences, Letters and Arts.
Modena Italian Society of Sciences.
Turin Royal Academy of Sciences.

Netherlands.

Amsterdam Royal Institute.
Rotterdam Batavian Society of Experimental Philosophy.

Prussia.

Berlin Royal Academy of Sciences.
..... Society of Experimental Philosophy.

Portugal.

Lisbon Royal Academy of Sciences.

Russia.

Pulkowa Observatory.
St. Petersburg Imperial Academy of Sciences.

Spain.

Cadiz Observatory.

Sweden and Norway.

Drontheim Royal Society of Sciences.
Stockholm Royal Academy of Sciences.

Switzerland.

Geneva Société de Phys. et d'Hist. Naturelle.

United States.

Boston American Academy of Sciences.
Cambridge Harvard University.
Philadelphia American Philosophical Society.
Washington Smithsonian Institution.
..... Observatory.

The *fifty* Foreign Members of the Royal Society.

A List of Public Institutions and Individuals, entitled to receive a copy of the Astronomical Observations (including Magnetism and Meteorology) made at the Royal Observatory at Greenwich, on making application for the same directly or through their respective agents, within two years of the date of publication.

Observatories.

Altona.
 Armagh.
 Berlin.
 Breslau.
 Brussels.
 Cadiz.
 Cambridge.
 Cape of Good Hope.
 Coimbra.
 Copenhagen.
 Dorpat.
 Dublin.
 Edinburgh.
 Helsingfors.
 Königsberg.
 Madras.
 Mannheim.
 Marseilles.
 Milan.
 Munich.
 Oxford.
 Palermo.
 Paris.
 Seeberg.
 Trevandrum.
 Tübingen.
 Turin.
 Vienna.
 Wilna.

Institutions.

Aberdeen.....University.
 BerlinAcademy.
 BolognaAcademy.
 BostonAmerican Academy of Sciences.
 Brunswick, U.S. ...Bowdoin College.
 CambridgeTrinity College Library.
 Cambridge, U.S. ...Harvard University.
 DublinUniversity.
 EdinburghUniversity.
 Royal Society.
 GlasgowUniversity.
 GöttingenUniversity.
 LeydenUniversity.
 LondonBoard of Ordnance.
 Queen's Library.
 Royal Institution.
 Royal Society.
 Oxford.....Savilian Library.
 ParisAcademy of Sciences.
 Board of Longitude.
 Dépôt de la Marine.
 PhiladelphiaAmerican Philosophical Society.
 St. AndrewsUniversity.
 St. Petersburg ...Imperial Academy.
 StockholmRoyal Academy of Sciences.
 UpsalRoyal Society.
 Waterville(U.S.)...College.

Individuals.

Christie, S. H., Esq. Woolwich.
 Lubbock, Sir John William, Bart. ... London.
 Lowndes Professor of Astronomy ... Cambridge.
 Plumian Professor of Astronomy
 President of the Royal Society..... London.
 Smyth, Captain W. H., R N. Aylesbury.
 South, Sir James Kensington.

List of Observatories, Institutions and Individuals, entitled to receive a Copy of the
Magnetical and Meteorological Observations made at the Royal Observatory, Green-
wich.

Observatories.

Bombay	
Barnaoul	M. Prang, 1st.
Cairo	M. Lambert.
Cambridge, United States	Professor Lovering.
Catherineburgh	M. Rochkoff.
Christiania	M. Hansteen.
Cincinnati	Dr. Locke.
Gotha	
Hammerfest	
Heidelberg	M. Tiedemann.
Hobarton	Commander Kay, R.N.
Kasan	M. Simonoff.
Kew	F. Ronalds, Esq.
Kremsmünster	Professor Koller.
Leipsic	
Marburg	Professor Gerling.
Nertchinsk	M. Prang, 2nd.
Nikolaieff	Dr. Knorre.
Pekin	M. Gachkévitche.
Prague	M. Kreil.
Pulkowa	M. Struve.
St. Petersburg	M. Kupffer.
Sitka	Messrs. Homann and Ivanoff.
Stockholm	Professor Selander.
Tiflis	M. Philadelphine.
Toronto	Captain Lefroy, R.A.
Upsal	Professor Svanberg.
Warsaw	Col. G. Du Plat (British Consul).
Washington	Lt. Maury, U.S. Navy.

Institutions.

Bombay	Geographical Society.
Bonn	University.
Bowditch Library	United States.
Cambridge	Philosophical Society.
Cherkow	University.
Falmouth	Royal Cornwall Poly- technic Society.
Kiew	University.
London	House of Lords, Library.

London	House of Commons, Li- brary.
.	King's College.
.	Royal Society.
.	University.
Moscow	University.
St. Bernard	Convent.
St. Petersburg	Geographical Society.
Washington	Smithsonian Institution.
Woolwich	Office of Mag. and Met. Publication.

Individuals.

Bache, Dr. A. D.	Washington.
Barlow, P. W., Esq.	Woolwich.
Colebrooke, Sir W.	
Demidoff, Prince Anatole de	Florence.
Dove, Professor	Berlin.
Elliot, Capt. C. M.	
Erman, Dr. Adolph	Berlin.
Fox, R. W., Esq.	Falmouth.
Gauss, Professor	Göttingen.
Gilliss, Lt. J. M., U.S. Navy	Washington.
Harris, Sir W. Snow	Plymouth.
Howard, Luke, Esq.	Tottenham.
Humboldt, Baron von	Berlin.
Kaemtz, Professor	Dorpat.
Kupffer, A. T.	St. Petersburg.
Lawson, Henry G., Esq.	Bath.
Lloyd, Rev. Dr.	Dublin.
Loomis, Professor	New York University.
Melvill, J. C., Esq.	East India House.
Mentchikoff, Prince	St. Petersburg.
Phillips, John, Esq.	York.
Quetelet, A.	Brussels.
Redfield, W. C., Esq.	New York.
Reid, Col. Sir W., R.E.	Malta.
Riddell, Capt., R.A.	Woolwich.
Roget, P. M., M.D.	London.
Sabine, Colonel, R.A.	Woolwich.
Senftenberg, Baron von	Prague.
Wartmann, Professor Elie	Geneva.
Younghusband, Capt., R.A.	Woolwich.

ROYAL MEDALS.

HER MAJESTY QUEEN VICTORIA, in restoring the Foundation of the Royal Medals, has been graciously pleased to approve the following regulations for the award of them :

That the Royal Medals be given for such papers only as have been presented to the Royal Society, and inserted in their Transactions.

That the triennial Cycle of subjects be the same as that hitherto in operation : viz.

1. Astronomy ; Physiology, including the Natural History of Organized Beings.
2. Physics ; Geology or Mineralogy.
3. Mathematics ; Chemistry.

That, in case no paper, coming within these stipulations, should be considered deserving of the Royal Medal, in any given year, the Council have the power of awarding such Medal to the author of any other paper on either of the several subjects forming the Cycle, that may have been presented to the Society and inserted in their Transactions ; preference being given to the subjects of the year immediately preceding : the award being, in such case, subject to the approbation of Her Majesty.

The Council propose to give one of the Royal Medals in the year 1852 for the most important paper in Physics, communicated to the Royal Society after the
MDCCCLII. b

termination of the Session in June 1848, and prior to the termination of the Session in June 1851, and printed in the Philosophical Transactions.

The Council propose also to give one of the Royal Medals in the year 1852 for the most important paper in Geology or Mineralogy, communicated to the Royal Society after the termination of the Session in June 1848, and prior to the termination of the Session in June 1851, and printed in the Philosophical Transactions.

C O N T E N T S.

- I. THE BAKERIAN LECTURE.—*Contributions to the Physiology of Vision.—Part the Second. On some remarkable, and hitherto unobserved, Phenomena of Binocular Vision* (continued). By CHARLES WHEATSTONE, F.R.S., Professor of Experimental Philosophy in King's College, London, Corresponding Member of the Academies of Science of Paris, Berlin, Brussels, Turin, Rome, Dublin, &c., of the Philosophical Society of Cambridge, the National Institute at Washington, &c. page 1
- II. *On the Automatic Registration of Magnetometers, and Meteorological Instruments, by Photography.—No. IV.* By CHARLES BROOKE, M.B., F.R.S. . . . 19
- III. *Experimental Researches in Electricity.—Twenty-eighth Series.* By MICHAEL FARADAY, Esq., D.C.L., F.R.S., Fullerian Prof. Chem. Royal Institution, Foreign Associate of the Acad. Sciences, Paris, Ord. Boruss. Pour le Mérite, Eq., Memb. Royal and Imp. Acadd. of Sciences, Petersburg, Florence, Copenhagen, Berlin, Göttingen, Modena, Stockholm, Munich, Bruxelles, Vienna, Bologna, &c. &c. 25
- IV. *An Account of two cases, in which Ovules, or their Remains, were discovered in the Fallopian Tubes of Unimpregnated Women who had died during the period of Menstruation.* By H. LETHEBY, M.B., Lond., Lecturer on Chemistry and Medical Jurisprudence in the Medical School of the London Hospital. Communicated by T. B. CURLING, Esq., F.R.S. 57
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- X. *Discovery that the Veins of the Bat's Wing (which are furnished with valves) are endowed with rythmical contractility, and that the onward flow of blood is accelerated by each contraction.* By T. WHARTON JONES, F.R.S., Fullerian Professor of Physiology in the Royal Institution of Great Britain, Ophthalmic Surgeon to University College Hospital, Corresponding Member of the Society of Biology of Paris, &c. &c. 131
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ERRATA.—PART II. 1851.

In equations 11, 12, 13, 15, 16, 17, 18, 19, 23, 24, for $H_1 \mp H_2$ read $H_1 - H_2$.

In equation 19, for $\frac{1}{12} \mu$ read $\frac{1}{24} \mu$.

In page 620, omit the third, fourth and fifth lines

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MDCCCLII.

ADJUDICATION of the MEDALS of the ROYAL SOCIETY for the year 1852 by
the PRESIDENT and COUNCIL.

The COPLEY MEDAL to BARON ALEXANDER VON HUMBOLDT, for his eminent services in Terrestrial Physics during a series of years.

The ROYAL MEDAL in the department of Physics, to J. P. JOULE, Esq., F.R.S., for his paper "On the Mechanical Equivalent of Heat," printed in the Philosophical Transactions for the year 1850.

The second ROYAL MEDAL to T. H. HUXLEY, Esq., F.R.S., for his paper "On the Anatomy and the Affinities of the Family of the Medusæ," printed in the Philosophical Transactions for the year 1849.

The RUMFORD MEDAL to G. G. STOKES, Esq., F.R.S., for his "Discovery of the Change in the Refrangibility of Light."

C O N T E N T S.

- XIII. *On the Anatomy of Doris.* By ALBANY HANCOCK and DENNIS EMBLETON, *M.D.*, *F.R.C.S.E.*, Lecturer on Anatomy and Physiology in the Newcastle-upon-Tyne College of Medicine in connection with the University of Durham. Communicated by Prof. EDWARD FORBES, *F.R.S.* page 207
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